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Boiler Rules and Regulations

STATE OF MONTANA

Industrial Accident Board
Department of Safety

Helena, Montana 59601

Fired Pressure Vessels Rules and Regulations

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FOREWORD

These minimum standards for safe operations governing the construction and operation of boilers have been adopted by the Industrial Board pursuant to Section 41-1703, Revised Codes of Montana.

These standards have been prepared by a committee composed of experienced representatives from the industry after many months of preparation, hearings and study. Their work has resulted in a code of safety which can be used by industry with confidence.

The requirements of the Montana Rules and Regulations governing the construction and operation of boilers are the same as those adopted and incorporated in the American Society of Mechanical Engineers Boiler Code. A copy of the ASME Code is on file in the office of the Industrial Accident Board.

Inquiries concerning this code should be directed to the Department of Safety, Industrial Accident Board, Helena, Montana 59601.

James J. Carden
Chairman
Industrial Accident Board

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BOILER RULES AND REGULATIONS

Chapter 1

Definitions

CHAPTER 1

DEFINITIONS

1.1 **Act.**

ACT shall relate to Chapter 15, of Section 69 of the Laws of Montana as amended by Chapter 7 of the Laws of Montana of 1967.

1.2 **Board.**

BOARD shall mean the Industrial Accident Board, Helena, Montana.

1.3 **Department.**

DEPARTMENT as herein used shall mean the department of safety of the Industrial Accident Board.

1.4 **Boiler Rules Committee.**

BOILER RULES COMMITTEE shall mean the committee created by law and empowered to make, alter, amend, and interpret rules and regulations for the safe construction, installation, operation, inspection and repair of boilers in this state.

1.4.1 **Chief Inspector.**

The term "CHIEF INSPECTOR" shall mean the chief boiler inspector appointed under the acts of the state or political subdivision and made effective as of April 1, 1969.

1.5 **State Boiler Inspector.**

STATE BOILER INSPECTOR shall mean any person or persons employed by the board for the purpose of inspecting boilers in accordance with Sections 69-1501 (2) and 69-1502 of the Revised Codes of 1947 of the Laws of Montana, as amended by the 1949, 1951, 1953, 1959, and 1967 Legislative Assemblies.

1.6 **Revised Codes of Montana (R.C.M.).**

REVISED CODES OF MONTANA (R.C.M.) shall mean the laws of Montana relating to industrial safety compiled from the Revised Codes of 1947 as amended by the 1949, 1951, 1953, 1959, and 1967 Legislative Assemblies.

1.7 **Special Boiler Inspector.**

SPECIAL BOILER INSPECTOR shall mean an inspector holding a Montana certificate issued by the board in accordance with Section 69-1501 (2), Revised Codes of Montana 1947, as amended by the 1967 Legislative Assembly.

1.8 **Owner or User.**

OWNER OR USER as used herein shall mean any person, firm, corporation, state or municipality owning or operating any boiler within this state.

1.9 **Internal Inspection.**

INTERNAL INSPECTION shall mean an inspection made when a boiler is shut down and handholes or manholes open for inspection of the interior insofar as construction permits.

1.10 **External Inspection.**

EXTERNAL INSPECTION shall mean an inspection which does not include examination of the internal surfaces of a boiler and shall preferably be an in-operation inspection.

1.11 **Inspection Certificate.**

INSPECTION CERTIFICATE shall mean the certificate issued by the board to the owner or user following an inspection by a state boiler inspector.

1.12 **Operating Certificate.**

OPERATING CERTIFICATE shall mean the certificate issued by the board to the owner or user when upon inspection by a special boiler inspector the boiler is found to comply with the rules and regulations of the board.

1.13 **ASME Boiler and Pressure Vessel Code.**

ASME BOILER AND PRESSURE VESSEL CODE shall mean the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers, Sections I, II, III, IV, VII and IX, with amendments and interpretations thereto made and approved by the council of the Society, whose headquarters are at 345 East 47th Street, New York, New York 10017, and from whom copies of the code with all amendments and interpretations can be obtained.

1.14 **Certificate.**

CERTIFICATE shall mean the written credential issued by the board to a special boiler inspector under provisions of Section 69-1501 (2) of the Revised Codes of Montana.

1.15 **Standard Boiler.**

STANDARD BOILER shall mean a boiler which bears the stamp of the state of Montana or of another state which has adopted a standard of construction equivalent to that required by the state of Montana, or a boiler which bears the ASME or the National Board stamp.

1.16 **Non-Standard Boiler.**

NON-STANDARD BOILER shall mean a boiler that does not bear the state of Montana stamp, the ASME, or the National Board stamp, or the stamp of any state which has adopted a standard of construction equivalent to that required by the committee of boiler rules.

1.17 **New Boiler Installations.**

NEW BOILER INSTALLATIONS insofar as the application of these rules and regulations are concerned, shall mean and include all boilers constructed, installed, placed in operation, or "contracted for" in accordance with Section 69-1503 (3), Revised Codes of Montana, 1947, as amended by the 1967 Legislative Assembly.

1.18 **Second-Hand Boiler.**

SECOND-HAND BOILER as used herein shall mean a boiler of which both the location and ownership have been changed after primary use.

1.19 **Existing Installations.**

EXISTING INSTALLATIONS insofar as the application of these rules and regulations are concerned, shall mean and include any boiler constructed, installed, placed in operation, or "contracted for" prior to the effective date of these rules and regulations.

1.20 **Reinstalled Boiler.**

REINSTALLED BOILER shall mean a boiler removed from its original setting and re-erected at the same location or erected at a new location without change of ownership.

1.21 **Condemned Boiler.**

CONDEMNED BOILER shall mean a boiler that has been inspected and declared unsafe or disqualified by legal requirements by an inspector qualified to take such action who has applied a stamping or marking designating its condemnation.

1.22 **Approved.**

APPROVED shall mean approved by the Industrial Accident Board and advisory committee.

1.23 **Boiler.**

BOILER shall mean a closed vessel intended for use in heating liquids by the application of heat to generate steam or other vapor to be used externally to itself and shall include hot water heating boilers and hot water supply boilers. A pressure vessel in which an organic fluid is vaporized by the application of heat resulting from the combustion of fuel (solid, liquid, gaseous) shall be constructed under the provisions of the ASME code. Vessels in which vapor is generated incidental to the operation of a process system, containing a number of pressure vessels such as used in chemical and petroleum manufacture, are not covered by the rules of Section 1 of the ASME code.

1.24 **Power Boiler.**

POWER BOILER shall mean a steam boiler operating at a pressure of more than 15 lbs. per sq. inch gage.

1.24.1 **High and Medium Temperature Hot Water Boilers.**

HIGH AND MEDIUM TEMPERATURE HOT WATER BOILERS shall conform to the requirements of paragraph 1.24, above.

1.25 **Low Pressure Heating Boiler.**

LOW PRESSURE HEATING BOILER shall mean a boiler operated at pressures not exceeding 15 lbs. per sq. inch gage steam or at a pressure not exceeding 160 lbs. per sq. inch gage and temperatures not exceeding 250° F. for water.

1.26 **Major Repairs.**

MAJOR REPAIRS as used herein shall be considered as repairs upon which the strength of a boiler would depend.

1.27 **Repair.**

REPAIR is a restoration of any damaged or impaired part to an effective and safe condition.

1.28 **Hot Water Supply Boiler.**

ALL HOT WATER SUPPLY BOILERS shall conform to the requirements of the ASME code for heating boilers.

1.29 **Place of Public Assembly.**

PLACE OF PUBLIC ASSEMBLY shall mean a building used in whole or in part for occupation by persons for such purposes as worship, hospitals, education, instruction, entertainment, amusement, or waiting transportation.

1.30 **Attendant.**

ATTENDANT shall mean the person in charge of the operation of a boiler. This person shall meet the requirements of Section 69-1509, Revised Codes of Montana.

1.31 **Automatic Operation of a Boiler.**

AUTOMATIC OPERATION OF A BOILER shall mean full control of feed water and fuel in order to maintain the pressure and temperature constant within the limits set. Controls must be such that the operation follows the demand without interruption. Manual restart may be required when the burner is off becouse of low water, flame failure, or power failure.

1.32 **Alteration.**

ALTERATION is a structural modification of, or a departure from an original design or existing construction.

1.33 **Licensed Operator.**

LICENSED OPERATOR shall mean any person granted a license in accordance with Section 69-1509, Revised Codes of Montana.

1.34 **Inspector.**

INSPECTOR shall mean a state boiler inspector or special boiler inspector as defined in Section 69-1501 (2), Revised Codes of Montana.

BOILER RULES AND REGULATIONS

Chapter 2

General Regulations

CHAPTER 2

GENERAL REGULATIONS

2.1 **Certificate for Special Boiler Inspectors:**

2.1.1 Application for this certificate shall be made on forms provided and forwarded to the board by the insurance carrier. Upon application by an insurance company authorized to do business in this state, a certificate shall be issued to only those employees who:

2.1.2 Hold a current and valid National Board commission.

2.2 **Inspection of Power and Heating Boilers:**

2.2.1 On or after July 1, 1969, each boiler used or proposed to be used within this state, except boilers exempt under Section 69-1515, Revised Codes of Montana, shall be thoroughly inspected by a state boiler inspector or special boiler inspector as to their construction, installation and condition as follows:

2.2.2 Power boilers, meaning boilers operating at steam or vapor pressures in excess of 15 lbs. per sq. inch gage, shall be inspected annually both internally and externally while not under pressure and shall also be inspected annually except as provided in Section 2.2.5 both internally and externally while not under pressure and shall also be externally inspected annually while under pressure where construction will permit.

2.2.3 Low pressure steam or vapor heating boilers, hot water heating boilers and hot water supply boilers subject to the requirements of the ASME heating boiler code requirements shall be inspected externally annually. Low pressure steam or vapor heating boilers shall be inspected internally every 2 years. Hot water heating boilers and hot water supply boilers shall be inspected internally every 3 years where construction will permit.

2.2.4 A grace period of 2 months beyond the periods specified in subdivisions 2.2.2 and 2.2.3 of this section may elapse between inspections.

2.2.5 Upon written application, longer inspection intervals may be authorized by the board in accordance with the procedures of Section 21, Revised Codes of Montana, 1969, where the owner of a power boiler shows that the boiler qualifies for a longer operating interval between inspections due to maintenance of continuous water treatment under competent and experienced supervision for the purpose of controlling and limiting corrosion deposits. For those cases in which longer inspection intervals are authorized, the operating certificate shall indicate the date the next inspection is due.

2.2.6 If at any time a hydrostatic test shall be deemed necessary, the same shall be made at the discretion of the inspector, owner, or user thereof.

2.2.7 All boilers to be installed in this state after the 12 months period from the date upon which the rules and regulations of the board shall become effective, shall be inspected during construction as required by the applicable rules and regulations.

2.3 **Valid Operating Certificate:**

2.3.1 No operating certificate issued for an insured boiler shall be valid after the boiler for which it was issued shall cease to be insured by a company duly authorized by this state to carry such insurance.

2.4 **Revocation of Operating Certificate:**

2.4.1 The board or its authorized representative may at any time revoke an operating certificate when, in his opinion, the boiler for which it was issued cannot be operated without menace to the public safety, or when the boiler is found not in compliance with the rules and regulations herein provided. Such revocation of an operating certificate shall continue in effect until such boiler shall have been made to conform to the rules and regulations of the board, and until said operating certificate shall have been reinstated.

2.5 **Violations:**

2.5.1 Violations shall be subject to Section 69-1503 (1) Chapter 15, or Sections 94-35-212, 94-35-213 and 94-35-214, Chapter 35, of the Revised Codes of Montana.

2.6 **Hydrostatic Tests:**

2.6.1 When it is necessary to make a special trip to witness the application of a hydrostatic test, an additional fee based on the scale of fees applicable to an internal inspection of the boiler shall be charged, plus mileage and per diem expenses, in accordance with the applicable rates established by the state of Montana. All other inspections, including shop inspections and inspections of second-hand or used boilers made by the boiler inspector, shall be charged for at the rate set by regulation, rule or order promulgated by the board.

2.7 **Manufacturers' Data Reports to Be Filed:**

2.7.1 Manufacturer's data reports on boilers which are to be operated at pressures in excess of 15 lbs. per sq. inch gage, unless exempt by the Act, shall be filed with the board. In the event that the manufacturers' data report is not available, the National Board form P-5 shall be filled out by the inspector on the first internal inspection of the boiler which shall then be filed with the board.

2.7.2 Details of boilers of special design (not complying fully with the ASME code) shall be submitted to the board and approval secured before construction is started.

2.8 **Application of State Serial Numbers:**

2.8.1 At the time of the first inspection, all steel boilers must be stamped when construction permits with the serial number of the state of Montana, preceded by the letters "MT"; said letters and figures to be not less than 5/16 inch in height. All cast iron boilers shall have securely attached to the front of the boiler a metal tag not less than one (1) inch in height which shall have the serial number of the state of Montana stamped thereon.

2.9 **Notification of Inspection:**

2.9.1 The owner or user shall prepare each boiler for internal inspection and shall prepare for and apply a hydrostatic pressure test whenever necessary, on the date specified by the inspector, within a reasonable time interval after the date of notification.

2.10 **Inspectors to Have No Other Interests:**

2.10.1 Inspectors shall not be engaged in the sale of any article or device that is related to boilers or operation thereof.

2.11 **Inspection Reports:**

2.11.1 Inspectors shall submit to the board an inspection report on each boiler subject to inspection within 30 days after completion of the inspection interval. Complete data shall be submitted on each non-standard boiler on form P-5 of the ASME code at the time of the first internal inspection. Subsequent internal inspections shall be reported on form P-6 of the ASME code. On all standard boilers the first and subsequent internal inspection shall be reported on form P-6 of the ASME code.

2.11.2 Reports shall be submitted within 30 days of the date of the inspection.

2.11.3 External inspections shall be reported on form P-6 of the ASME code immediately when hazardous conditions affecting the safety of the boiler are found to exist.

2.12 Insurance Companies to Notify the Department of New, Cancelled or Suspended Risks:

2.12.1 All insurance companies shall notify the board within 30 days of all boiler risks written, cancelled, not renewed or suspended because of unsafe conditions.

2.13 Insurance Companies to Notify the Board of Defective Boilers:

2.13.1 If a special boiler inspector, upon the first inspection of a boiler, finds that the boiler or any of the appurtenances are in such condition that his company refuses insurance, the company shall immediately notify the board.

2.14 Defective Conditions Disclosed at the Time of External Inspections:

2.14.1 If upon an external inspection there is evidence of a leak or crack, enough of the covering of the boiler shall be removed to satisfy the inspector in order that he may determine as to the safety of the boiler, or if the covering cannot be removed at that time, he may order the operation of the boiler stopped until such time as the covering can be removed and proper examination made.

2.15 Owner to Notify the Board in Case of Accident:

2.15.1 When an accident occurs which serves to render a boiler inoperative, the owner or user shall immediately notify the board, and submit a detailed report of the accident.

2.15.2 In case of serious accident, such as explosion, notice shall be given immediately by telephone, telegraph, or messenger and the boiler room and surrounding area secured and sealed off and neither the boiler nor any of the parts thereof shall be removed or disturbed before the necessary investigations have been made by the duly authorized boiler inspectors except for law enforcement, rescue or the saving of human life.

2.16 Operating Certificate Fees:

2.16.1 If a boiler shall upon inspection be found to be suitable and to conform to these rules and regulations, the owner or user shall pay directly to the board a fee in accordance with Section 69-1512, Revised Codes of Montana, for each boiler required to be inspected before an operating certificate shall be issued.

2.16.2 If the owner or user of each boiler required to be inspected refuses to allow an inspection to be made or refuses to pay the above fee, the operating certificate shall be suspended by the board until the owner or user complies with the requirements.

2.16.3 The owner or user who causes a boiler to be operated without possessing a valid certificate of operation shall be subject to the penalties as provided for in Section 69-1507, Revised Codes of Montana.

2.17 Validity of Inspection Certificates:

2.17.1 An inspection certificate shall be issued and shall be valid until expiration unless some defect or condition affecting the safety of the boiler is disclosed.

2.17.2 An operating certificate issued for a boiler inspected by a special boiler inspector shall be valid only if the boiler for which it was issued continued to be insured by a duly authorized insurance company.

2.18 Suspension of Operating or Inspection Certificate:

2.18.1 If upon inspection a boiler is found to be in such condition that it is unsafe to operate, the operating or inspection certificate shall be suspended by the board.

2.18.2 Any person, firm, partnership, corporation, state or municipality causing such unsafe objects to be operated shall be subject to the penalties as provided for in Section 69-1503, Revised Codes of Montana.

2.19 Condemned Boilers:

2.19.1 Any boiler having been inspected and declared unsafe by the board shall be stamped with an arrowhead stamp having an overall length of one-half (½) inch and a width of three-eighths (⅜) inch on either side of the letters "XX" and the letters "MT", as shown by the following facsimile, which will designate a condemned boiler:

XX MT XX

2.19.2 Any person, firm, partnership, corporation, state or municipality using or offering for sale a condemned boiler for operation within this state shall be subject to the penalties as provided for in Section 69-1503, Revised Codes of Montana.

2.20 Non-Standard Boilers:

2.20.1 Operation of non-standard boilers in the state is prohibited unless duly authorized and approved by the board and committee.

2.20.2 A non-standard boiler now in use in this state, if removed from the state, may be brought in and re-installed upon obtaining approvel of the board and the boiler advisory committee.

2.21 Second-Hand Boilers:

2.21.1 Before a second-hand boiler can be operated in this state, an inspection must be made by a state boiler inspector or by an inspector holding a National Board commission, and the data submitted by him shall be filed by the owner or user of the boiler with the board for approval.

2.22 Reinstalled Boilers:

2.22.1 In any case where a boiler is moved and reinstalled, the fittings and appliances must comply with the ASME code.

2.23 Factors of Safety for Existing Installations:

2.23.1 The inspector is authorized to increase factors of safety if the condition of the boiler warrants it.

2.23.2 If the owner or user does not concur with the inspector's decision, he may appeal to the board who may request a joint inspection by the board and the boiler advisory committee.

2.23.3 Each inspector shall render his report to the board, who shall render the final decision, based upon the data contained in all the inspectors' reports.

2.24 Major Repairs:

2.24.1 Where a major repair is necessary, an inspector shall be called for consultation and advice as to the best method of making such repair; after such repair is made it shall be subject to the approval of the inspector.

2.24.2 Repairs to all boilers and their appurtenances shall conform to the applicable sections of the ASME code.

2.25 Repairs by Welding:

2.25.1 Welding repairs shall be done in accordance with Section IX, welding qualifications. ASME boiler and pressure vessel code.

2.25.2 When repairs are to be made where fusion welding is to be used, permission shall be obtained from an inspector and the welding shall be done in accordance with the rules recommended by the National Board of boiler and pressure vessel inspectors.

2.26 Riveted Patches:

2.26.1 In applying riveted patches, the design of the patch and method of installation shall be in accordance with the rule for riveted patches recommended by the National Board of boilers and pressure vessel inspectors.

2.27 Removal of Safety Devices:

2.27.1 No person, except under the direction of an inspector, shall attempt to remove or shall do any work upon any safety appliance while the boiler is in operation, except that those safety appliances that can be isolated from boiler pressure during repair are excluded from this provision.

2.27.2 Should any of these appliances be repaired during an outage of a boiler, they must be reinstalled and in proper working order before the object is again placed in service.

2.27.3 No person shall in any manner load the safety valve or valves to maintain a working pressure in excess of that stated on the inspection certificate.

2.28 Inspection Fees:

2.28.1 Inspection fees are as listed in Section 69-1512, Revised Codes of Montana.

2.29 Inpection of Boilers:

2.29.1 All boilers, unless otherwise exempt by these rules and regulations, and which are subject to regular inspections as provided for in Chapter 2, Section 2.2, shall be prepared for such inspections, or hydrostatic tests whenever necessary, or by the owner or user within a reasonable period of time of the date specified by the inspector.

2.29.2 The owner or user shall prepare each boiler for internal inspection, and shall prepare for and apply the hydrostatic test whenever necessary, on the date specified by the inspector, within a reasonable time interval after date of notification, Section 21, Revised Codes of Montana, 1969.

2.29.3 The owner or user shall prepare a boiler for internal inspection in the following manner:

(a) Prior to draining of the boiler, the boiler shall be allowed to cool; the water then shall be drawn off and the boiler thoroughly washed of all loose sludge and sediment.

(b) All manhole and handhole plates, wash-out plugs, and plugs in water column connections deemed necessary for adequate inspection shall be removed; the furnace and combustion chambers thoroughly cooled and cleaned.

(c) All grates of internally fired boilers shall be removed.

(d) At each annual inspection, brick work shall be removed as required by the inspector in order to determine the condition of the boiler, headers, furnace, supports or other parts.

(e) The steam gage shall be removed for testing.

(f) Any leakage of steam or hot water into the boiler shall be cut off by disconnecting the pipe or valve at the most convenient place.

2.29.4 If the boiler is jacketed so that the longitudinal seams of shells, drums, or domes cannot be seen, enough of the jacketing, setting wall, or other forms of casing or housing shall be removed so that the size of the rivets, pitch of the rivets, and other data necessary to determine the safety of the boiler may be obtained, provided such information cannot be determined by other means.

2.29.5 If a boiler has not been properly prepared for an internal inspection or the owner or user fails to comply with the requirements for hydrostatic test as set forth in these rules, the inspector may decline to make the inspection or test, and the operating or inspection certificate shall be withheld until the owner or user complies with the requirements.

2.30 Lap Seam Crack:

2.30.1 The shell or drum of a boiler in which a lap seam crack is discovered along a longitudinal riveted joint shall be permanently discontinued from use.

2.30.2 If the boiler is not more than 15 years of age, a complete new course of the original thickness may be installed at the discretion of the inspector.

2.30.3 Patching is prohibited; (by "lap seam crack" is meant the typical crack frequently found in lap seams extending parallel to the longitudinal joint and located either between or adjacent to rivet holes).

2.31 **Hydrostatic Pressure Tests:**

2.31.1 A hydrostatic pressure test, when applied to boilers of riveted or welded construction, shall conform to the applicable sections of the ASME code.

2.32 **Low-Water Fuel Cut-Offs:**

2.32.1 All automatically-fired steam, vapor, and hot water heating and hot water supply boilers shall be equipped with automatic low-water fuel cut-off. In addition, all automatically fired steam and vapor heating boilers shall be equipped with a cut-off in accordance with the applicable requirements of the ASME code.

2.33 **Safety Appliances:**

2.33.1 No person shall remove or tamper with any safety appliances prescribed by these rules.

2.33.2 All repairs and adjustments shall be made by qualified and authorized personnel.

2.33.3 The resetting of safety valves shall be done in the presence of an inspector except the prohibition may be waived upon application to the board if the work is performed under the supervision of persons who by training and experience are suitably qualified, and the valves sealed.

2.34 **Blow-Off Tanks:**

2.34.1 Blow-off facilities shall conform to the provisions set forth in the pamphlet entitled "BOILER BLOW-OFF EQUIPMENT" published by the National Board of Boiler and Pressure Vessel Inspectors, whose address is 1155 N. High Street, Columbus, Ohio.

2.35 **Location of Discharge:**

2.35.1 The discharge of safety valves, blow-off pipes and other outlets shall be located so as to prevent injury to personnel.

2.36 **Electric Broilers:**

2.36.1 All appliances required for electric boilers shall be attached in accordance with the following rules:

(a) The grounding of the shell shall be permanently fastened on some part of the boiler and shall be grounded in accordance with the current National electrical code.

(b) A suitable screen or guard shall be provided around high tension bushings and a sign posted warning of high voltage. The screen or guard shall be so located that it will be impossible for anyone working around the boiler to accidentally come in contact with the high tension circuits.

2.36.2 When adjusting safety valves, the power circuit to the boiler shall be open.

2.36.3 The boiler may be under pressure, but the power line shall be open while the operator is making the necessary adjustments.

2.36.4 Each kw of electrical energy consumed by an electric boiler operating at maximum rating shall be considered the equivalent of one (1) sq. ft. of heating surface of a fire tube boiler when determining the required amount of safety valve capacity.

2.36.5 All electric boilers shall be built and installed in accordance with the applicable section of the NEC and ASME codes, and in addition the various component parts of the boiler shall bear the applicable Underwriters Laboratry or equivalent labels.

2.37 Clearance for Access:

2.37.1 When boilers are installed or replaced, clearance shall be provided to allow access for inspection, maintenance, and repair, and passageways shall have an unobstructed width of 18 inches. Clearance for repair and cleaning may be provided through a door or access panel into another area, provided the opening is of sufficient size.

2.37.2 Power boilers having a steam generating capacity in excess of 5,000 lbs. per hour or having a heating surface in excess of 1,000 sq. ft. or input in excess of 5,000,000 btu per hour shall have a minimum clearance of 7 ft. from the top of the boiler to the ceiling.

2.37.3 Low pressure heating boilers and hot water supply boilers which exceed any one of the following limits: 5,000,000 btu per hour input; 5,000 lbs. steam per hour capacity or 1,000 sq. ft. heating surface; and power boilers which do not exceed any of the following limits: 5,000,000 btu per hour input; 5,000 lbs. steam per hour capacity or 1,000 sq. ft. heating surface; and all boilers with manholes on top of the boiler, except those described in 2.37.2 and 2.37.4 shall have minimum clearance of 3 ft. from the top of the boiler to the ceiling.

2.37.4 Package boilers, miniature boilers, low pressure heating boilers and hot water supply boilers with no manhole on top of shell and not exceeding any of the above limits shall have a minimum clearance of 2 ft. from the ceiling.

2.37.5 All boilers shall be so located that adequate space will be provided for the proper operation of the boiler and its appurtenances, for the inspection of all surfaces, tubes, water walls, economizer, piping, valves and other equipment, and for their necessary maintenance and repair.

2.37.6 A minimum of two means of egress located opposite of each other shall be provided for all boiler rooms.

2.38 Shop Inspection:

2.38.1 Any new power boiler, heating boiler, etc., shall be stamped ASME and may be additionally stamped National Board. Construction that is not ASME but acceptable to the board by prior outlined procedure will be stamped "MONTANA SPECIAL."

2.38.2 Inspections made by the state boiler inspector at the request of a boiler manufacturer shall be charged for at the rate of $50 for one-half day and $75 for one day plus all expenses, to include traveling, as set forth in Section 69-1512, Revised Codes of Montana.

2.38.3 This charge shall be in addition to the regular charge or fee for inspection or certificate when the boiler is installed.

2.39 Inspection of Second-Hand Equipment:

2.39.1 Charges for inspection of second-hand equipment shall be at the rate provided for in item 2.38 (above) for "SHOP INSPECTION."

2.40 Conditions Not Covered by These Rules:

2.40.1 In any condition not covered by these rules, the ASME boiler and pressure vessel code for new installations shall apply.

2.40.2 Should any section, subsection, sentence, clause, phrase, provision or exemption of these rules be declared unconstitutional or invalid for any reason, such invalidity shall not affect the remaining portion of provisions hereof.

BOILER RULES AND REGULATIONS

Chapter 3

Construction, Installation, Inspection and Repair

CHAPTER 3

CONSTRUCTION, INSTALLATION, INSPECTION AND REPAIR

3.1 New Boiler Installation Requirements:

3.1.1 No boiler, except reinstalled boilers and those exempted by Section 69-1515, Revised Codes of Montana, shall hereafter be installed in this state unless it has been constructed, inspected and stamped in conformity with the ASME boiler code, and is approved, registered and inspected in accordance with the requirements of these rules and regulations.

3.1.2 A boiler having the standard stamping of another state that has adopted a standard of construction equivalent to the standard of the state of Montana may be accepted by the board provided, however, that the owner desiring to install the boiler shall make application for the installation and shall file with this application the manufacturer's data report covering the construction of the boiler in question.

3.1.3 All new boiler installations, including reinstalled boilers, shall be installed in accordance with the requirements of the latest revision of the ASME boiler code and these rules and regulations.

3.1.4 Where special designs are not covered by said code, their construction may be determined by the manufacturer in cooperation with the purchaser, subject to the approval of the state boiler inspector and the committee of boiler rules.

3.1.5 Upon completion of the new installation, all boilers shall be inspected by a state boiler inspector, or a special boiler inspector. At the time of this inspection each boiler shall be stamped with a serial number of the state of Montana preceded by the letters "MT", said letters and figures to be not less than 5/16 inch in height. The stamping shall not be concealed by lagging or paint and shall be exposed at all times.

3.2 Existing Installations of Power Boilers:

3.2.1 The maximum allowable working pressure for standard boilers shall be determined in accordance with the applicable provisions of the edition of the ASME code under which they were constructed and stamped.

3.2.2 The maximum allowable working pressure on the shell of a non-standard boiler or drum shall be determined by the strength of the weakest section of the structure, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint or tube ligaments, the inside diameter of the weakest course and the factor of safety allowed by these rules and regulations:

$$\frac{TS \times t \times E}{R \times FS} = \text{Maximum Allowable Working Pressure in psi}$$

Where

TS = ultimate tensile strength of shell plates, psi.

t = minimum thickness of shell plate, in weakest course in inches.

E = efficiency on longitudinal joint.

For riveted construction, E shall be determined by rules given in paragraph P-181 of ASME boiler construction code for power boilers.

For tube ligaments, E shall be determined by rules in paragraphs P-192 and P-193 of ASME boiler construction code for power boilers.

For seamless construction, E shall be considered 100%.

R = inside radius of the weakest course of the shell or drum in inches.

FS = factor of safety permitted.

(a) Tensile strength:

When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken as 55,000 psi for steel and 45,000 psi for wrought iron.

(b) Crushing strength of mild steel:

The resistance to crushing of mild steel shall be taken at 95,000 psi of cross sectional area.

(c) Strength of rivets in shear:

When computing the ultimate strength of rivets in shear, the following values in psi of the cross sectional area of the rivet shank shall be used:

	PSI
Iron rivets in single shear	38,000
Iron rivets in double shear	76,000
Steel rivets in single shear	44,000
Steel rivets in double shear	88,000

When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross sectional area of rivets, after driving, may be selected from the following table or as ascertained by cutting out one rivet in the body of the joint:

TABLE OF RIVETS BASED ON PLATE THICKNESS

Thickness of Plate	1/4"	9/32"	5/16"	11/32"	3/8"	13/32"	7/16"	15/32"	1/2"	9/16"	5/8"
Diameter of Rivet after Driving	11/16"	11/16"	3/4"	3/4"	13/16"	13/16"	15/16"	15/16"	15/16"	1-1/16"	1-1/16"

(d) Factors of safety:

The following factors of safety shall be increased by the inspector if the condition and safety of the boiler demand it: The lowest factor of safety permissible on existing installations shall be 4.5 excepting for horizontal return tubular boilers having continuous longitudinal lap seams more than 12 ft. in length where the factor of safety shall be 8, and when this latter type of boiler is removed from its existing setting, it shall not be reinstalled for pressure in excess of 15 psig. Reinstalled or second-hand non-standard boilers all have a minimum factor of safety of 6 when the longitudinal seams are of lap riveted construction, and a minimum factor of safety of 5 when the longitudinal seams are of butt and double strap construction.

3.2.3 Age Limit of Fire Tube Boilers:

The age limit of horizontal return tubular, flue or cylinder boilers having a longitudinal lap joint and operating at a pressure in excess of 50 psig shall be subject to the operating requirements of the ASME code for boilers in this category. At the discretion of the board, continued operation will be subject to inspection resulting in:

(a) Reducing pressure operation.

(b) Yearly continuance granted subject to existing condition.

(c) Replacement.

3.2.4 Welded Boilers:

Boilers having either longitudinal or circumferential seams of fusion welded construction shall have been constructed and stamped in accordance with the rules and regulations of the ASME boiler code or shall have the standard stamping of a state that has adopted a standard of construction equivalent to the standards of the ASME boiler construction code.

3.2.5 Cast Iron Headers and Mud Drums:

The maximum allowable working pressure on a water tube boiler, the tubes of which are secured to cast iron or malleable iron headers, or which have cast iron mud drums shall not exceed 160 psig.

3.2.6 Pressure on Cast Iron Boilers:

The maximum allowable working pressure for any cast iron boiler shall be 15 psig, for steam boilers, and not exceeding 160 psig and temperatures not exceeding 250° F. for hot water boilers.

3.2.7 Safety Valve Requirements:

(a) The use of weighted-lever safety valves is prohibited and these valves shall be replaced by safety valves that conform to the requirements of Section 1 of the ASME boiler and pressure vessel code.

(b) Safety valves having either the seat or disc of cast iron shall not be used. Safety valves with openings above the seat or disc shall not be used.

(c) Each boiler shall have at least one safety valve and if it has more than 500 sq. ft. of water heating surface, it shall have two or more safety valves.

(d) The method of computing the steam generating capacity of the boiler shall be as given in paragraph A-12 of the ASME boiler and pressure vessel code.

(e) The safety valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings. Where alteration is required to conform to this rule and regulation, owners and users shall be allowed one (1) year in which to complete the work.

(f) No valve of any description shall be placed between the safety valve and the boiler, nor on the discharge pipe (if used) between the safety valve and atmosphere. All safety valve discharge piping shall be vented to the exterior of the building or a safe place of discharge and shall be full size and fitted with an open drain to prevent water lodging in the upper part of the safety valve or discharge pipe. When an elbow is placed on a safety valve discharge pipe, it shall be located close to the safety valve outlet or the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be so located or pipe as not to endanger persons using walkways or platforms used to control the main valves of boilers or steam headers.

(g) The safety valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6% above the highest pressure to which any valve is set and in no case to more than 6% above the maximum allowable working pressure.

(h) For each boiler one or more safety valves on the boiler proper shall be set at or below the maximum allowable working pressure. If additional valves are used, the highest pressure setting shall not exceed the maximum allowable working pressure by more than 3%. The complete range of pressure settings of all of the saturated steam safety valves on a boiler shall not exceed 10% of the highest pressure to which any valve is set.

(i) When two or more boilers operating at different pressures and safety valve settings are interconnected, the lower pressure boilers or interconnecting piping shall be equipped with safety valves of sufficient capacity to prevent over-pressure considering the generating capacity of all boilers.

(j) In those cases where the boiler is supplied with feed water directly from pressure mains without the use of feeding apparatus (not to include return traps), no safety valve shall be set at a pressure greater than 94% of the lowest pressure obtained in the supply main feeding the boiler.

(k) The relieving capacity of the safety valves on any boiler may be checked by one of the three following methods and if found to be insufficient, additional safety valve capacity shall be provided:

(1) By making the accumulation test, which consists of shutting off all other steam discharge outlets from the boiler forcing the fires to the maximum. The safety valve capacity shall be sufficient to prevent a pressure in excess of 6% above the maximum allowable working pressure. This method should not be used on a boiler with a superheater or reheater.

(2) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity (steam generating capacity) upon the basis of the heating value of this fuel. These computations shall be made as outlined in the appendix of the ASME boiler code for power boilers.

(3) By determining the maximum evaporative capacity by measuring the feed water.

NOTE: When either of the methods outlined in (2) or (3) is employed, the sum of the safety valve capacity shall be equal to or greater than the maximum evaporative capacity (maximum steam generating capacity) of the boiler.

3.2.8 Boiler Feeding and Feed Piping:

(a) All boilers shall have a feed supply which will permit the boiler to be fed at any time while under pressure.

(b) A boiler having more than 500 sq. ft. of water heating surface shall have at least two means of feeding, one of which shall be an approved feed pump, injector or inspirator. Where a source of feed directly from pressure mains is available at sufficient pressure to feed the boiler against a pressure 6% greater than the release pressure of the safety valve with the highest release setting, this may be considered one of the means.

(c) The feed water shall be introduced into the boiler in such a manner that it will not be discharged close to riveted joints of shell or furnace sheets or directly against surfaces exposed to gases at high temperature, or direct radiation from the fire.

(d) The feed pipe to the boiler shall be provided with a check valve or cock between the check valve and the boiler. When two or more boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check valve and source of supply. Whenever a globe valve is used on feed piping, the inlet shall enter below the valve seat with the valve located as close to the boiler as is practicable.

(e) Where deaerating heaters are not employed, it is recommended that the temperature of the feed water be no less than 120° F. to avoid the possibility of setting up localized stress. Where deaerating heaters are employed, it is recommended that the minimum feed water temperature be no less than 215° F. so that dissolved gases may be thoroughly released.

3.2.9 Fusible Plugs:

Fire-actuated fusible plugs if used shall conform to the requirements of the ASME boiler and pressure vessel code for power boilers.

3.2.10 Water Columns, Gage Glasses and Gage Cocks:

(a) No outlet connections (except for damper regulator, feed water regulator, low water fuel cut-out, drains, steam gages, or such apparatus that does not permit the escape of an appreciable amount of steam or water therefrom) shall be placed on the piping that connects the water column to the boiler. The minimum size of the steam and water connection to the water column shall be one (1) inch pipe size and each water column shall be provided with a valve drain of at least ¾ inch pipe size, the drain to be piped to a safe location. All fittings used in connection with water column piping shall be crosses or tees (no elbows permitted) with plugged or capped openings provided to facilitate inspection.

(b) Each boiler shall have three or more gage cocks, located within the range of the visible length of the water glass, except when such boiler has two water glasses with independent connections to the boiler, located on the same horizontal line and not less than 2 ft. apart. Boilers not over 36 inches in diameter in which the heating surface does not exceed 100 sq. ft. need have but two gage cocks. Electric boilers operating at pressures not exceeding 400 psi need not be fitted with gage cocks.

(c) For all installations where the water gage glass or glasses are more than 30 ft. from the boiler operating floor, it is recommended that water level indicating or recording gages be installed at eye height from the operating floor.

3.2.11 Steam Gages:

(a) Each steam boiler shall have a steam gage connected to the steam space or to the water column or its steam connection. The steam gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock placed near the gage and provided with a tee or lever handle arranged to be parallel to the pipe in which it is located when the cock is open.

(b) The dial of the steam gage shall be graduated to approximately double the pressure at which the safety valve is set, but in no case to less than 1½ times this pressure.

(c) When a steam gage connection longer than 10 ft. becomes necessary, a shut-off valve may be used near the boiler provided the valve is of the outside screw and yoke type and is locked open. The line shall be ample size with provisions for free blowing.

(d) Each boiler shall be provided with a ¼ inch nipple and globe valve connected to the steam space for the exclusive purpose of attaching a test gage when the boiler is in service so that the accuracy of the boiler steam gage may be ascertained.

3.2.12 Stop Valves:

(a) Each steam discharge outlet from a boiler (except safety valve connections) shall be fitted with a stop valve located as close as practicable to the boiler. When a stop valve is so located that water can accumulate, ample drains shall be provided. The drainage shall be piped to a safe location and shall not be discharged on the top of the boiler or its setting.

(b) When boilers provided with manholes are connected to a common steam main, the steam connection from each boiler shall be fitted with two stop valves having an ample free blow drain below them. The discharge of this drain shall be visible to the operator while manipulating the valves and shall be piped clear of the boiler setting. The stop valves shall consist preferably of one automatic non-return valve (set next to the boiler) and a second valve of the outside screw and yoke type.

3.2.13 Blow-Off Piping:

(a) The construction of the setting around each blow-off pipe shall permit free expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blow-off piping.

(b) All blow-off piping, when exposed to furnace heat, shall be protected by fire brick or other heating resisting material, so constructed that the piping may be readily inspected.

(c) Each boiler shall have a bottom blow-off pipe, fitted with a valve or cock, in direct connection with the lowest water space practicable. Cocks shall be of the gland or guard type and suitable for the pressure allowed. The use of globe valves shall not be permitted, except as provided for by the ASME boiler and pressure vessel code. When the maximum workable pressure exceeds 100 psig, each blow-off pipe shall be provided with two valves or a valve and cock, such valves and cocks to be of the extra heavy type.

(d) When the maximum allowable working pressure exceeds 100 psig, blow-off piping shall be extra heavy from the boiler to the valve or valves, and shall be run full size without use of reducers or bushings. The piping shall be extra heavy wrought iron or steel and shall not be galvanized.

(e) All fittings between the boiler and blow-off valve shall be steel or extra heavy fittings of malleable iron. In case of renewal of blow-off pipe or fittings, they shall be installed in accordance with the rules and regulations for new installations.

3.2.14 Repairs and Renewals of Boiler Fittings and Appliances:

Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the work shall comply with the ASME boiler and pressure vessel code for new installations.

3.2.15 Care of Boilers:

It is recommended that Section VII of the ASME boiler and pressure vessel code covering suggested rules for the care of power boilers be used as a guide for proper and safe operating practices.

3.2.16 Conditions Not Covered by Rules and Regulations:

All cases not specifically covered by these rules and regulations shall be treated as new installations or may be referred to the board for instructions concerning specific requirements.

3.3 New Installations of Heating Boilers:

3.3.1 Requirements:

(a) No heating boiler, except reinstalled boilers and those exempted by Section 69-1515, Revised Codes of Montana, shall hereafter be installed in this state unless it has been constructed, inspected and stamped in conformity with Section IV of the ASME boiler and pressure vessel code and is approved, registered and inspected in accordance with the requirements of these rules and regulations.

(b) All new heating boiler installations, including reinstalled boilers, must be installed in accordance with the requirements of the latest revision of the ASME boiler and pressure vessel code and these rules and regulations.

3.3.2 Inspections:

(a) Upon completion of the installation, all boilers shall be inspected by a state boiler inspector or a special boiler inspector. At the time of this inspection all steel heating boilers must be stamped with the serial number of the state of Montana, preceded by the letters "MT", said letters and figures to be not less than 5/16 inch in height. All cast iron heating boilers shall have securely attached to the front of the boiler a metal tag not less than one (1) inch in height, which shall have the serial number of the state of Montana stamped thereon.

(b) It is recommended that the return water connections to all low pressure steam heating boilers supplying a gravity return heating system be so arranged as to form what is known as the "water line return" so that the water cannot be forced out of the boiler below the safe water level. This connection is shown in Fig. H-G-703.1, Section IV, ASME boiler and pressure vessel code.

3.4 Existing Installations of Heating Boilers:

3.4.1 ASME Code Boilers:

The maximum allowable working pressure of a boiler built in accordance with the ASME code shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast upon the boiler or upon a plate secured to it.

3.4.2 Non-Code Riveted Boilers:

The maximum allowable working pressure on the shell of a non-code riveted heating boiler shall be determined in accordance with Part III, Section 2, Rule 1, covering existing installations, power boilers, except that in no case shall the maximum allowable working pressure of a steam heating boiler exceed 15 lbs. or a hot water boiler exceed 30 lbs. at a temperature not exceeding 250° F.

3.4.3 Non-Code Welded Boilers:

The maximum allowable working pressure of a non-code steel or wrought iron heating boiler of welded construction shall not exceed 15 lbs. For other than steam service, the maximum allowable working pressure shall be calculated in accordance with Section IV of the ASME code.

3.4.4 Non-Code Cast Iron Boilers:

(a) The maximum allowable working pressure of a non-code boiler composed principally of cast iron shall not exceed 15 lbs. for steam service or 30 lbs. for hot water service.

(b) The maximum allowable working pressure of a non-code boiler having cast iron shell or heads and steel or wrought iron tubes shall not exceed 15 lbs. for steam service or 30 lbs for water service.

3.4.5 General:

If in the judgment of the inspector a steam heating boiler is unsafe for operation at the pressure previously approved, the pressure shall be reduced, proper repair made, or the boiler retired from service.

3.4.6 Safety Valves:

(a) Each steam heating boiler shall be provided with one or more safety valves with a total area of not less than one (1) sq. inch for each 5 sq. ft. of grate area, or equivalent, if grates are not used. It is further provided that the steam relieving capacity of the safety valve or valves on any boiler shall conform to the requirements of paragraph 3.2.7, "SAFETY REQUIREMENTS." If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run.

(b) No stop valve of any description shall be located between a boiler and its safety valve; nor in the safety valve discharge pipe. The safety valve may be located on a main steam pipe connection at the boiler.

3.4.7 Water Relief Valves:

(a) Each hot water heating or hot water supply boiler shall have one or more relief valves of the spring-loaded type without disc guides on the pressure side of the valve.

(b) The valves shall be set to relieve at a pressure at or below the maximum allowable working pressure of the boiler and so arranged that they cannot be reset to relieve at a higher pressure of the boiler. Each relief valve shall have a substantial device which will positively lift the disc from its seat at least 1/16 inch when there is no pressure on the boiler.

(c) Such valves shall be BTU rated and shall bear the ASME and National Board stamp.

3.4.8 Steam Gage:

Each steam boiler shall have a steam pressure gage connected to the steam space of the boiler itself or on steam pipe near the boiler. The graduations of the steam gage shall not be less than one (1) lb. nor more than 5 lbs.

3.4.9 Water Gage Glass:

Each steam boiler shall have at least one water gage glass with the lowest visible part above the heating surfaces in the primary combustion chamber. When, in the judgment of the inspector, the heating surfaces above the low water line may be injured by contact with gases or high temperature, the water gage glass shall be raised until the lowest visible part of the gage glass is above such heating surface.

3.4.10 Stop Valves and Check Valves:

(a) If a boiler may be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return line between the boiler and the system.

(b) If any part of a heating system may be closed off from the remainder of the system by closing a steam stop valve, there shall be a check valve in the condensate return pipe between the boiler and the system.

3.4.11 Feedwater Connections:

Feedwater connections shall be independent of any water gage connections and be made to the condensate return pipe or reservoir of the condensate return pump. There shall be a stop valve and a check valve in the feedwater line at the boiler.

3.4.12 Return Pump:

Each condensate return pump where practicable shall be provided with an automatic water level control set to maintain the water level within the limits of the two gage cocks.

3.4.13 Repairs and Renewals of Fittings and Appliances:

Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the work shall conform to the applicable section of the ASME boiler and pressure vessel code.